FCC CFR47 PART 22 SUBPART H

CERTIFICATION TEST REPORT

FOR

CDMA Phone with Bluetooth

MODEL NUMBER: SM-B510LL

FCC ID: A3LSMB510LL

REPORT NUMBER: 14I17321-1

ISSUE DATE: March 31, 2014

Prepared for

SAMSUNG ELECTRONICS CO., LTD.
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Prepared by

UL VERIFICATION SERVICES INC.
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	3/31/14	Initial	P. Kim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: **SAMSUNG ELECTRONICS CO., LTD.**

EUT DESCRIPTION: **CDMA Phone with Bluetooth**

MODEL: SM-B510LL

SERIAL NUMBER: 1845713(conducted) & 1845714(radiated)

DATE TESTED: March 27 – 31, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H	PASS

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 22

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ul.com

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 18000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a CDMA Phone with Bluetooth.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/2 4/27						
Band	Frequency Range(MHz)	Modulation	Conducted		Radiated	
		Peak	Peak(dBm)	Peak(mW)	Peak(dBm)	Peak(mW)
BC0	824~849	1xRTT	24.1	257.04	22.24	167.53

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
BC0, 824~849MHz	1.64

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	N/A	N/A	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES (CONDUCTED SETUP)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF Out	1	Spectrum Analyzer	Shielded	None	NA
2	Antenna Port	1	EUT	Shielded	0.1m	NA
3	RF In/Out	1	Communication Test Set	Shielded	1m	NA

I/O CABLES (RADIATED SETUP)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	AC Adapter	Un-shielded	1.2m	No
2	Jack	1	Headset	Shielded	1m	No
3	RF In/out	1	Communication Test Set	Un-shielded	2m	Yes

TEST SETUP

The EUT is continuously communicated to the call box during the tests.

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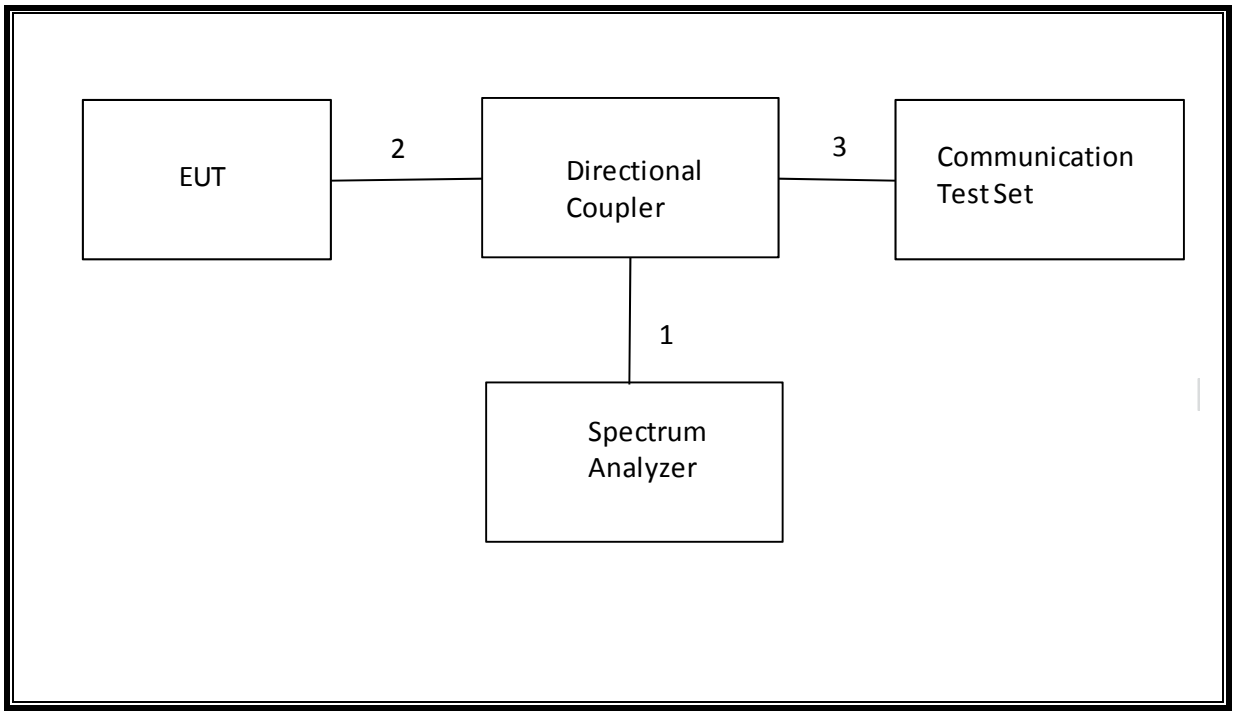
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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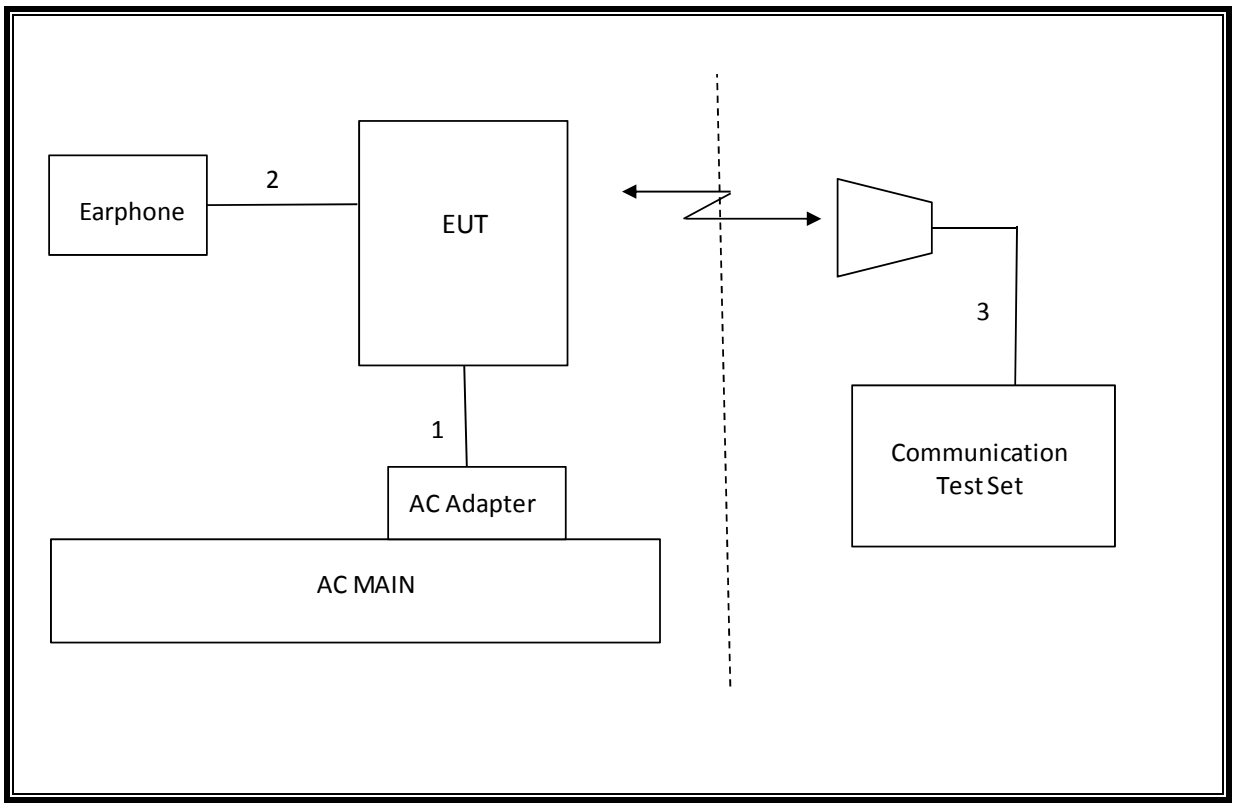
SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01179	02/26/15
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	08/14/14
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 18 GHz	EMCO	3115	C00784	09/25/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/15
Communications Test Set	R&S	CMW500	T159	07/02/14
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
Vector signal generator, 6 GHz	Agilent / HP	E4438C	None	07/06/14
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	02/14/15
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR

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7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	RSS Gen	Occupied Band width (99%)	N/A	Conducted	Pass	1279KHz
22.917(a)	RSS-132(4.5.1)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-13.055dBm
2.1046	N/A	Conducted output power	N/A		Pass	24.1dBm
22.355	RSS-132(4.3)	Frequency Stability	2.5PPM		Pass	0.007 PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	22.24dBm
22.917(a)	RSS-132(4.5.1)	Radiated Spurious Emission	-13dBm		Pass	-51.6dBm

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8.1. CDMA2000

8.1.1. 1xRTT

TEST PROCEDURE

This procedure assumes the Agilest 8960 Test Set has the following applications installed and with valid license.

Application	Rev, License
CDMA2000 Mobile Test	B.13.08, L

- Call Setup > Shift & Preset
- Cell Info > Cell Parameters > System ID (SID) > 7
  > Network ID (NID) > 1
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > Please see following table or details
- FCH Service Option (SO) Setup > Please see following table or details
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
  > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits
  - Rvs Power Ctrl > All Up bits (Maximum TxPout)

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8.1.2. CDMA2000 OUTPUT POWER RESULT

1xRTT

Band	Mode	Ch	Freq. (MHz)	Avg Pwr (dBm)
BC0	RC1, SO55 (Loopback)	1013	824.70	23.9
		384	836.52	23.6
		777	848.31	24.1
	RC3, SO55 (Loopback)	1013	824.70	23.9
		384	836.52	23.6
		777	848.31	24.0
	RC3, SO32 (+F-SCH)	1013	824.70	23.8
		384	836.52	23.6
		777	848.31	24.1

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9. PEAK TO AVERAGE RATIO

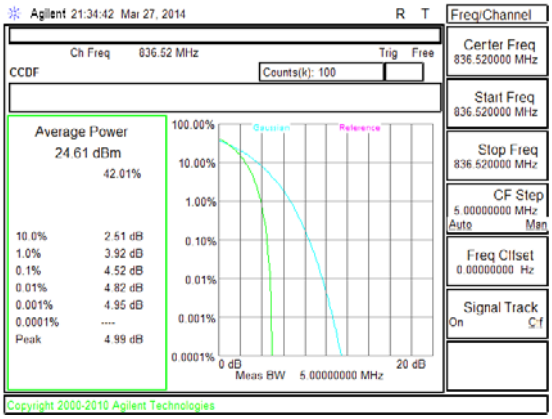
Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

9.1. CONDUCTED PEAK TO AVERAGE RESULT

Band BC0 1xRTT	 Band BC0 1xRTT Mid channel	

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10. LIMITS AND CONDUCTED RESULTS

10.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v02r01 - 06/07/2013)

MODES TESTED

CDMA RTT BC0

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10.1.1. OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
BC0	1xRTT	1013	824.7	1278	1431
		384	836.52	1279	1432
		777	848.31	1275	1421

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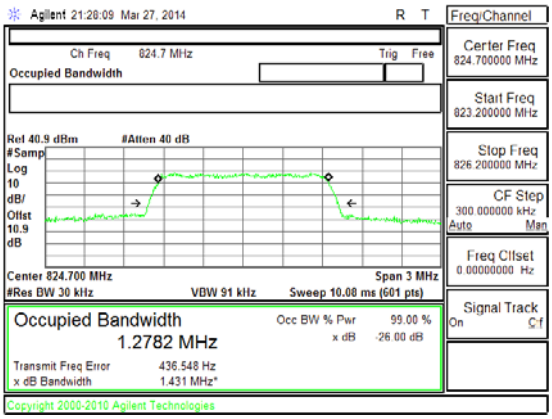
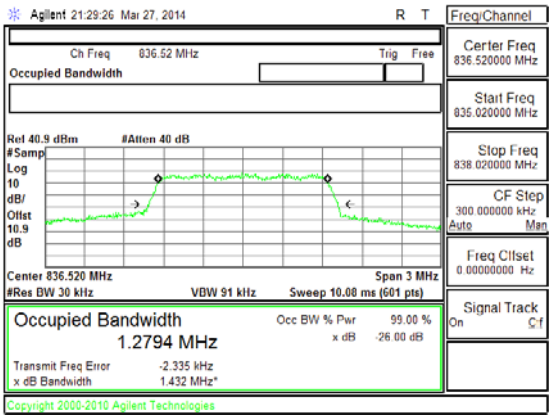
10.1.2. OCCUPIED BANDWIDTH PLOTS

Band BC0 1xRTT

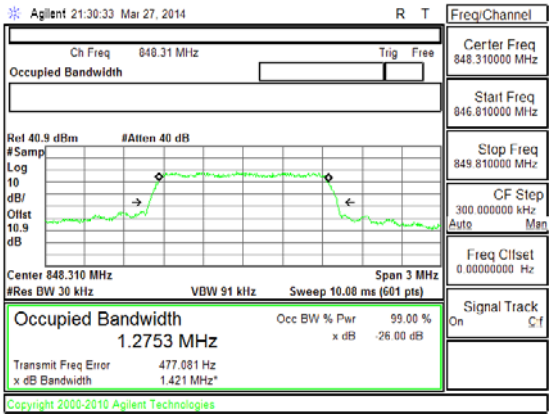


Band BC0 1xRTT OBW Low channel



Band BC0 1xRTT OBW Mid channel

Band BC0 1xRTT



Band BC0 1xRTT OBW High channel

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10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01
The transmitter output was connected to an Agilent 8960 or a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

MODES TESTED

CDMA RTT BC0

RESULTS

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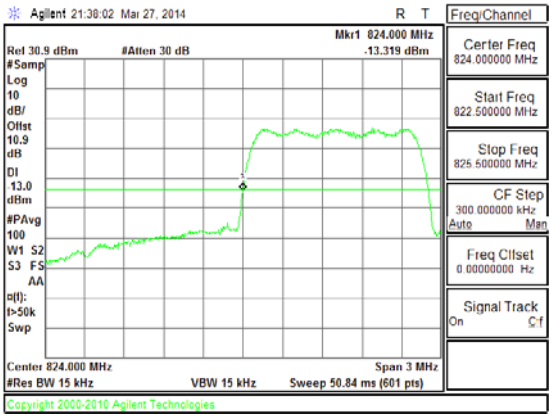
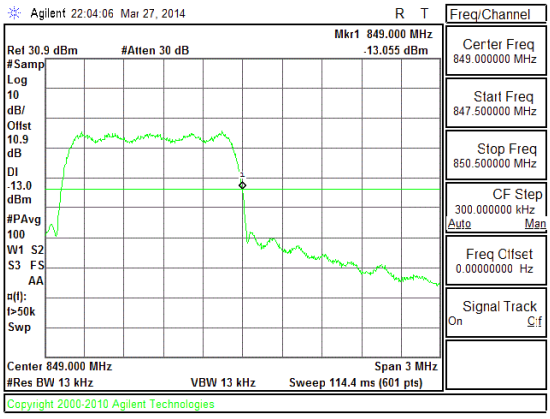
10.2.1. BAND EDGE PLOTS

Band BC0 1xRTT	 Band BC0 1xRTT CBE Low channel	 Band BC0 1xRTT CBE High channel

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10.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

MODES TESTED

CDMA RTT BC0

RESULTS

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10.3.1. OUT OF BAND EMISSIONS RESULT

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
BC0	1xRTT	824.7	-27.56	-13	-14.56
		836.52	-25.58	-13	-12.58
		848.31	-26.65	-13	-13.65

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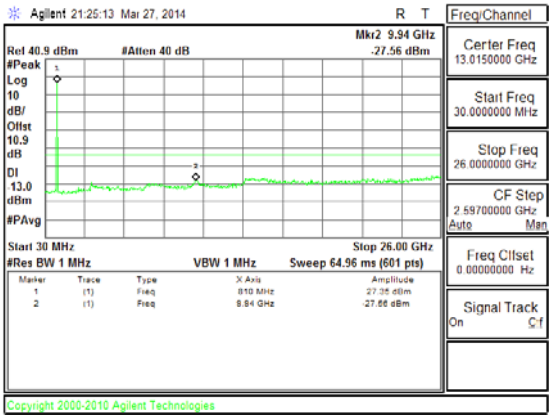
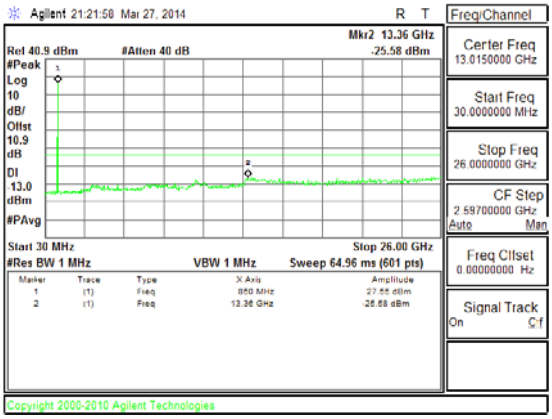
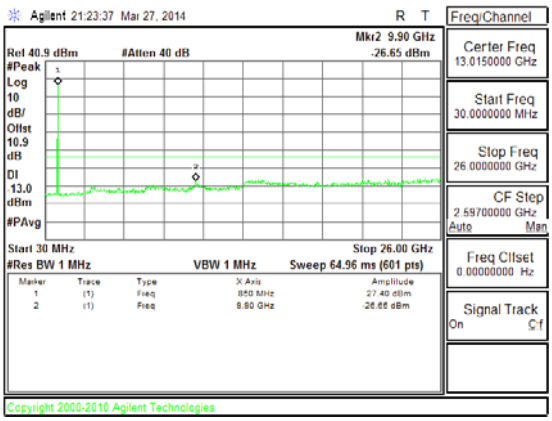
Band BC0 1xRTT	 Band BC0 1xRTT CSE Low channel	 Band BC0 1xRTT CSE Mid channel
Band BC0 1xRTT	 Band BC0 1xRTT CSE High channel	

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10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

MODES TESTED

CDMA RTT BC0

RESULTS

See the following pages.

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10.4.1. FREQUENCY STABILITY RESULTS

BC 0 Cell BAND – 836.52MHz

Reference Frequency: CDMA2000_Mid Channe 836.520002 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.300 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	836.520000	0.002	2.5
3.70	40	836.519999	0.004	2.5
3.70	30	836.520000	0.002	2.5
3.70	***20***	***836.520002***	***0***	***2.5***
3.70	10	836.519998	0.005	2.5
3.70	0	836.519996	0.007	2.5
3.70	-10	836.519998	0.005	2.5
3.70	-20	836.519999	0.004	2.5
3.70	-30	836.520001	0.001	2.5

Reference Frequency: Mid Channel 836.6 MHz @ 20ºC Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
			Delta (ppm)	Limit (ppm)
3.70	***20***	***836.519998***	***0.00000***	***2.5***
4.20	20	*836.519998*	*0.00000*	2.5
3.30	20	*836.519999*	*-0.00120*	2.5

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11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17

TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
BC0	1xRTT	1013	824.7	18.981	79.09
		384	836.52	21.221	132.46
		777	848.31	22.241	167.53

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11.1.2. ERP/EIRP Data

Band

BC0

1xRTT

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14I17321
Date: 03/28/14
Test Engineer: K. Kedida
Configuration: EUT with AC adapter &HP
Mode: CDMA RTT BC0

Test Equipment:
Receiving: Sunol T185, and Chamber C Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 8ft SMA Cable (SN # 208955002) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	16.22	V	0.9	0.0	15.32	38.5	-23.1	
824.70	19.88	H	0.9	0.0	18.98	38.5	-19.5	
Mid Ch								
836.52	17.66	V	0.9	0.0	16.76	38.5	-21.7	
836.52	22.12	H	0.9	0.0	21.22	38.5	-17.2	
High Ch								
848.31	18.54	V	0.9	0.0	17.64	38.5	-20.8	
848.31	23.14	H	0.9	0.0	22.24	38.5	-16.2	

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11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

RESULTS

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11.2.1. SPURIOUS RADIATION PLOTS

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I17321
Date: 03/28/14
Test Engineer: K. Kedida
Configuration: EUT with AC adapter &HP
Mode: CDMA RTT BC0 HARM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber C	T343 8449B	Filter 1	Part 24

Band BC0 1xRTT

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.7MHz									
1.650	-21.5	V	3.0	37.4	1.0	-57.9	-13.0	-44.9	
2.474	-20.8	V	3.0	36.4	1.0	-56.2	-13.0	-43.2	
3.298	-17.8	V	3.0	35.8	1.0	-52.6	-13.0	-39.6	
1.650	-15.2	H	3.0	37.4	1.0	-51.6	-13.0	-38.6	
2.474	-22.3	H	3.0	36.4	1.0	-57.7	-13.0	-44.7	
3.298	-19.4	H	3.0	35.8	1.0	-54.2	-13.0	-41.2	
Mid Ch, 836.52MHz									
1.673	-20.3	V	3.0	37.3	1.0	-56.6	-13.0	-43.6	
2.509	-20.3	V	3.0	36.4	1.0	-55.6	-13.0	-42.6	
3.346	-18.5	V	3.0	35.8	1.0	-53.3	-13.0	-40.3	
1.673	-15.5	H	3.0	37.3	1.0	-51.8	-13.0	-38.8	
2.509	-22.0	H	3.0	36.4	1.0	-57.4	-13.0	-44.4	
3.346	-19.0	H	3.0	35.8	1.0	-53.7	-13.0	-40.7	
High Ch, 848.31 MHz									
1.696	-18.8	V	3.0	37.3	1.0	-55.1	-13.0	-42.1	
2.544	-19.1	V	3.0	36.3	1.0	-54.4	-13.0	-41.4	
3.393	-19.3	V	3.0	35.7	1.0	-54.0	-13.0	-41.0	
1.696	-18.8	H	3.0	37.3	1.0	-55.1	-13.0	-42.1	
2.544	-21.2	H	3.0	36.3	1.0	-56.6	-13.0	-43.6	
3.393	-19.1	H	3.0	35.7	1.0	-53.8	-13.0	-40.8	

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Note: No other emissions were detected above the system noise floor.

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